

METCHNIKOFF CONFIRMED IN HIS THEORY OF LONG LIFE

Noted Scientist's Discoveries as to Longevity Borne Out by Tests
According to Loudon M. Douglas in His Book, "The Bacillus of Long Life"---Races That Live to a Hundred and More.

In a little village in Bulgaria there is living to-day Baba Vasilka, who has reached the goodly age of 126 years and is declared to be "the oldest woman in the world." She has a son, Tudor, a youth of 101 years, active and vigorous, and altogether likely to add several more decades to his life before he sinks into the painless sleep that comes as the finale to the condition known as old age.

Were Baba and Tudor Vasilka living in any other country than Bulgaria, they would be objects of curiosity and solicitude not only to their immediate neighbors, but to those of their countrymen living at great distances from them, who would still watch their career with the interest due to cases of such unparalleled longevity.

In Bulgaria, however, the age reached by Baba Vasilka has not been uncommon in the past, and even to-day the aged lady could find among her contemporaries a score or more robust persons whose respective ages are not far from hers and who seem to have the promise of many happy and active years to come before the possible limit of their earthly pilgrimage is run.

And that explains why Baba and Tudor Vasilka are of special interest to science, although they fail to excite the wonder of their countrymen. This aged mother and son are really typical, not

be under medical treatment to doctor themselves; soured milk may or may not be beneficial in their case—that is for the medical man to say; and further, if it should be beneficial the doctor ought to have its preparation under his control. Slight differences in quality and purity may count for much in cases of acute disease, differences which might not matter to the person who requires no medical attention, and who consumes the article as health-giving food. A considerable body of evidence is already on record as to the potency in certain cases of soured milk as a curative agent, and it seems to have taken its place in medicine as a recognized remedy.

"There is a wide field of usefulness, however, outside of the strictly medical one. Prof. Metchnikoff has collected many striking examples of individuals and peoples inhabiting different parts of the world, who thrive, and in many cases attain to a great age, and whose diet consists largely of soured milk. He has made a wide and general inquiry into the causes which tend to shorten life, and makes out a strong case in support of the view that in many cases this is the result of what is called auto-intoxication or self-poisoning.

"In man, and in the mammalia generally, the colon, or large intestine, is



Kabyles in the North of Africa Swinging a Skin Full of Milk So as to Sour It. (Illustrations by Courtesy of G. P. Putnam's Sons.)



Handling Milk in the Pyrenees in Goat or Sheep Skins. The Churning Is Often Done Merely by Rocking the Skin Across the Knees.

exceptional examples of people who live to a great age in Bulgaria, and who attain this age, according to investigating scientists, by the use of soured milk, their principal food all their lives.

Nearly four years ago, it will be remembered, Prof. Elie Metchnikoff gave to the world the result of his investigations on the subject of longevity, in which he held that the chief enemy to long life in the human species is the large intestine, or colon. This organ, by becoming the breeding place for poisonous microbes, is the fertile cause for the debility that comes with old age, and the death that cuts off many a career whose normal course is not nearly run.

Having found what he believed to be the cause for the relatively short period of the average human life, Prof. Metchnikoff set himself to discover the agency which would effectively combat the destructive microbes generated in the large intestine and thus insure to man the full quota of years normally his. This conquering agency, he said, had found in lactic acid.

"This theoretical view," he tells us, "is confirmed by the collection of facts regarding races which live chiefly on soured milk, and among which great ages are common."

Prof. Metchnikoff's findings, the authority attaching to his name, the cogency of his reasoning and their definite, practical outcome, have attracted other scientists along the same lines of investigation, as a result of which there has been collected much confirmatory evidence for the sour-milk theory, as well as elaborations on the practical side, of how to capture this bacillus of long life and how to make the most effective use of it. One of the most complete of these investigations appears in a volume by Loudon M. Douglas, F. R. S. E., entitled "The Bacillus of Long Life," recently published in their Science Series by G. P. Putnam's Sons.

In this book Mr. Douglas, profiting by the experiments that have been made since Prof. Metchnikoff announced his belief in the efficacy of lactic acid to prolong life, takes up the various ways in which milk has been fermented, shows the dangers to be encountered in the unscientific methods for reaching the same results, and gives "a manual of the preparation and souring of milk for dietary purposes," in which the genuine health-producing bacillus, the *Bacillus Bulgaricus*, may be confidently believed to be present. Mr. Douglas's book is thus practical as well as theoretical, and right here he gives a warning as to the indiscriminate use of what he tells us.

"It is not the aim of this book," he writes, "to teach persons who should

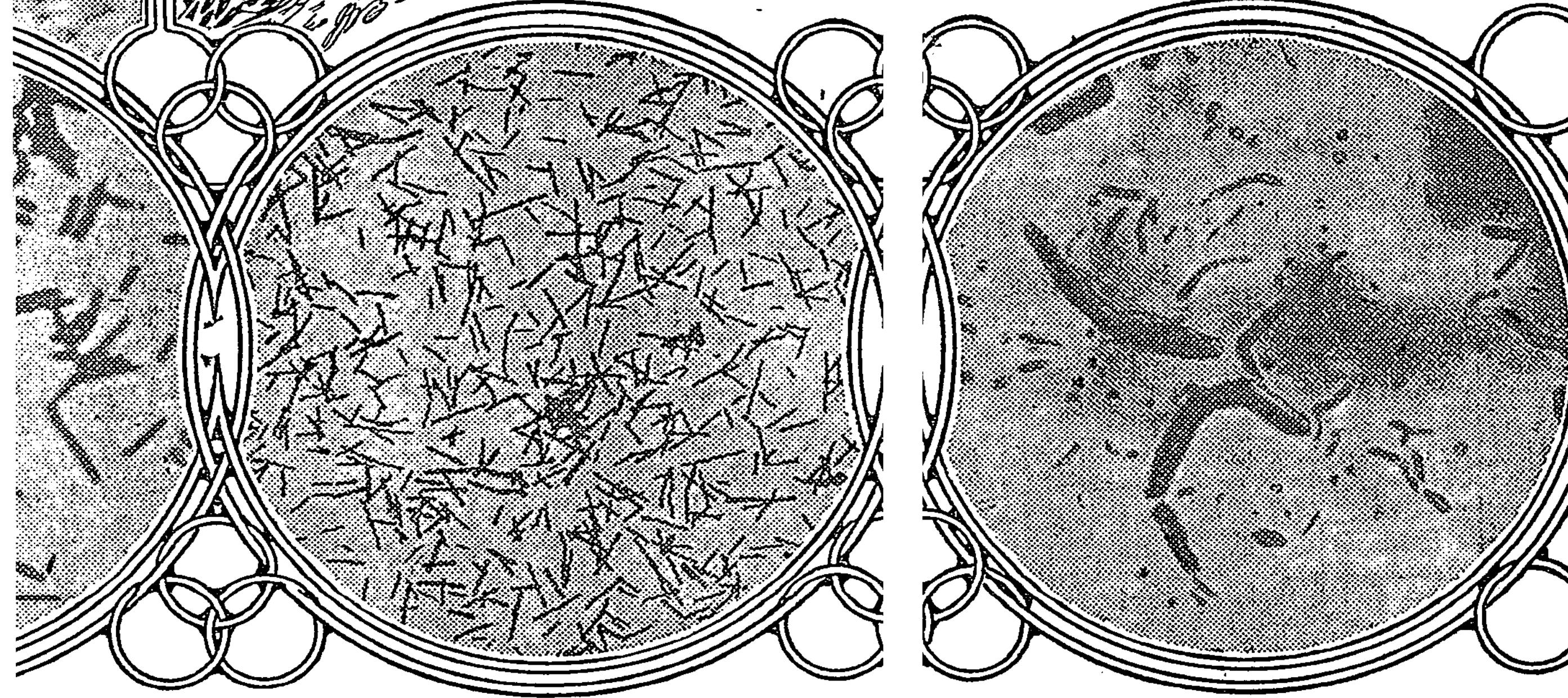


Photo-micrograph of Soured Milk Inoculated with a Tablet of Bacillus Bulgaricus.

Photo-micrograph of a Culture of Bacillus Bulgaricus.

Photo-micrograph from Milk That Has Been Allowed to Sour Spontaneously.

very largely developed; this organ is not of much value in the digestion of food, and seems to be chiefly a receptacle for waste material; it is, as a rule, extremely rich in bacterial flora, which produce putrefactive changes in the waste material. As a result, various poisonous principles are evolved, and these find their way into the blood, accompanied frequently, there is every reason to believe, by the injurious bacteria themselves.

"In this way, many diseases and ailments are produced which shorten life. The inquiry then naturally turns to what is the best way of dealing with this state of matters. It is known that the bacteria referred to flourish best in alkaline or at least non-acid surroundings, and it is known that these conditions very frequently exist in the large intestine.

"In this way, many diseases and ailments are produced which shorten life. The inquiry then naturally turns to what is the best way of dealing with this state of matters. It is known that the bacteria referred to flourish best in alkaline or at least non-acid surroundings, and it is known that these conditions very frequently exist in the large intestine.

"Acids are the best antiseptics; they have been used from time immemorial as preservatives; pickles are preserved in vinegar, or acetic acid, and when milk is allowed to sour under proper conditions, the germs of putrefaction are destroyed or their activity inhibited, and it keeps a considerable time. Doubtless, in hot countries, it was this property of lactic acid which first led to milk being artificially soured with a view to its preservation as an article of food. So powerful is lactic acid in this respect that it is a custom in some countries to preserve meat by placing it in soured milk.

"How can acids be applied so as to control the bacterial flora of the large intestine? Not in the ordinary way, because, when administered through the mouth, they are used up long before they can penetrate to the colon. The brilliant idea occurred to Prof. Metchnikoff of administering acid-producing germs which might work their way through the digestive system, and, reaching the large intestine, produce the acid required. After much experimenting the bacillus of Massol, *Bacillus Bulgaricus*, was adopted as the most suitable.

"The Bulgarian bacillus is an extremely vigorous one, multiplying with great rapidity, and persisting in conditions that would be fatal to other

microbes. The growth and development of bacteria is interfered with by the products of their own activity; thus, ordinary lactic-acid-producing organisms die when a certain amount of lactic acid has been developed; the same fate overtakes the Bulgarian bacillus, but it survives longer, and is able to produce as much as 2% per cent of lactic acid in milk before it ceases operations.

"It seemed, therefore, the most likely to be able to survive the journey through the digestive system. Experiments fully bore out this supposition, as no great difficulty was encountered in naturalizing the Bulgarian bacillus in the large intestine, not only in milk cultures, but grown in solution of malt, bouillon &c. It thrives in all kinds of sugar, and therefore can be administered in a variety of media, very beneficial results following in many cases.

"Direct tests showed a large reduction of the injurious intestinal flora when the Bulgarian bacillus had been naturalized in the colon, and the bacillus persisted long after it had ceased to be administered. Specialists who have taken up the subject report the cure of many ailments through the agency of soured milk, and it seems to have entered upon a lengthening of the period of existence.

"It has been noticed also that while these very old people are able to perform a certain amount of manual labor, there is not the same tendency to the mental decay which is so prominent and sad a feature among Western nations at a period of about 70 or 80 years of age.

"It would seem, indeed, as if the habit of living long was well known in ancient times, and that, like many of the other valuable arts and sciences, it fell under a cloud during the Middle Ages, or, perhaps, the significance of the use of soured milk fell into neglect, and even after the revival of letters in the sixteenth century, still remained obscure."

"How to revive this bacillus which, according to Mr. Douglas's suggestion, may have made possible the long and active lives of the patriarchs, and bring it into use in countries where it is scarcely known to-day, is the practical question which the book helps to solve.

The bacillus occurring in milk that has been allowed to sour spontaneously is very different from that in which the *Bacillus Bulgaricus* has been introduced, as may be seen by comparing the photo-micrographs of these two bacilli. The one carries with it the "germ of long life," the other introduces into the human system poisons from which the destruction of life is inevitable. The problem is to insure the presence of the Bulgarian bacillus, and no other, in the soured milk used.

"The fact of so many old people being found," says Mr. Douglas, "in countries where soured milk is a staple of diet naturally raises the question

to a man of 65 years of age elsewhere. It is quite common to find among the peasants who live to such a large extent upon soured milk individuals of 110 and 120 years of age.

"In the ancient dairy practice soured milk was the principal product, and the extraordinary ages which are recorded of the patriarchs, if translated into the modern denomination, would not appear to be so imaginary after all, when it is considered that we have thousands of examples at the present day of men and women enjoying quite as long a period of existence.

"It has been noticed also that while these very old people are able to perform a certain amount of manual labor, there is not the same tendency to the mental decay which is so prominent and sad a feature among Western nations at a period of about 70 or 80 years of age.

"It would seem, indeed, as if the habit

of living long was well known in ancient times, and that, like many of the other valuable arts and sciences, it fell under a cloud during the Middle Ages, or, perhaps, the significance of the use of soured milk fell into neglect, and even after the revival of letters in the sixteenth century, still remained obscure."

"How to revive this bacillus which, according to Mr. Douglas's suggestion,

may have made possible the long and active lives of the patriarchs, and bring it into use in countries where it is scarcely known to-day, is the practical question which the book helps to solve.

The bacillus occurring in milk that has been allowed to sour spontaneously is very different from that in which the *Bacillus Bulgaricus* has been introduced, as may be seen by comparing the photo-micrographs of these two bacilli. The one carries with it the "germ of long life," the other introduces into the human system poisons from which the destruction of life is inevitable. The problem is to insure the presence of the Bulgarian bacillus, and no other, in the soured milk used.

"The fact of so many old people being found," says Mr. Douglas, "in countries where soured milk is a staple of diet naturally raises the question

as to whether its general use in other countries might not have a beneficial effect on health and longevity. Its usefulness as a remedial agent in certain diseases is already demonstrated; is there not a strong probability, amounting almost to a certainty, that its consumption by people in health would tend to ward off many ailments and prolong life?

"Of course, there will be some for whom it is not suitable; there are people who cannot eat strawberries without discomfort, but no one thinks of prohibiting the general use of the fruit on that account. In the matter of diet the person in health, if he exercises ordinary care, may be left to find out for himself what suits him.

"The soured milk remedy is not a disagreeable one, as, when properly prepared, the article forms both a pleasant and refreshing article of diet. The question of getting the right article, however, is a very important one. Milk is a splendid rearing ground for many bacteria, some of which are very in-

culture is bad, the Bulgarian bacillus is not present, or, if so, only in small numbers.

"With these simple tests, combined with proper care, one cannot go far wrong. The Eastern nations who prepare soured milk in various forms do not exercise the care we have predicted, but they seem to make the article of fairly constant and good quality. It has been suggested in explanation that, as the ordinary flora differs in different countries, the bacterial flora varies in a similar manner, and that in these Eastern countries injurious bacteria are not so prevalent in the atmosphere as they are with us.

"It is also said that the flavor of the soured milk prepared in Bulgaria is quite different from that prepared in Paris, London, or New York; one reason probably is that the 'maya' or ferment used in Bulgaria contains several other organisms besides the Bulgarian bacillus, which raises the question whether a pure culture of one bacillus is the best to use.

"Prof. Metchnikoff found that this bacillus alone had certain defects; it attacks fat and is apt to give a talcoid taste when cream is present in the milk. He therefore associated with it another lactic-acid-producing organism, and this combination is the basis of his culture called 'lactobacilline.'

"A good deal can be said for the use of skinned or separated milk instead of whole milk. Cream, as a rule, contains far more bacteria than the rest of the milk, and we therefore start from a surer foundation when it is removed, besides, the mechanical separator, now so largely used, removes slime and other impurities from the milk, and these also are hotbeds of bacteria.

"Soured milk may be taken at any time, the first thing in the morning, before or after meals, or the last thing at night. The quantity will vary with the individual, but from half a pint to a pint is a fair amount for daily use. If one wishes to have the maximum effect it is necessary for the time being to curtail the use of butcher's meat and substitute fish, yolk of eggs, and other similar foods.

"Not much alcohol should be taken, and smoking might be reduced to a minimum. Those who cannot take even skinned milk may use whey in which to cultivate the bacillus. It is not desirable to employ the whey which has been separated by the use of rennet, as in cheese, or junket making. A better article is obtained by adding a very small quantity of pure hydrochloric acid to milk which has been boiled, and then filtering through a sieve, which retains the curd, while the liquid whey passes through.

"A pinch of soda is added to neutralize the excess of acid, and, after boiling, the liquid should turn red litmus paper blue. It is then ready for the addition of the culture and incubation in the same manner as with milk. A solution of malt—the extract dissolved in hot water is convenient—may also be used instead of milk, and strongly malted bread or biscuits are excellent to take with the soured milk or cultures in other mediums to supply food for the bacillus in the form of malt sugar.

"Other sugars, cane or grape, are also very useful, and may be taken in the form of fruit juices, syrups, confections, jams, and sweet puddings.

"We lay stress on the use of soured milk or other cultures of the Bulgarian bacillus by people in health as a probable preventive of disease and a possible agent in the lengthening of life, but it may be of interest to give a short account of its use by medical men in the treatment of various ailments.

"An English authority on the subject, Dr. Herschell, states that the symptoms of the poisoning of the system by the toxic substances produced by injurious bacteria in the large intestines may include headaches, misery, and depression of spirits, drowsiness and stupor, giddiness, dizziness, fatigue without obvious cause, both of the muscles and brain, fear, panic, and nervousness, disagreeable sensations in the limbs or face, such as numbness, tickling or pricking, crawling sensation of weight or of heat or of cold, dyspepsia of the sort where there is a deficiency of hydrochloric acid and pepsin in the gastric juice.

"These symptoms may have other causes, and when one or several of them are present a chemical and physical examination is necessary to prove that they have resulted from auto-intoxication. When this is shown the soured milk treatment is indicated, and many striking cures are detailed as witness to its efficacy.

"The liver and kidneys are the natural guardians of the body against the toxins we are speaking of, and frequently they are overstrained. The soured milk treatment greatly lightens their load. In malignant diseases of the stomach, soured milk will frequently be retained when all other foods are rejected. In cases of neurasthenia and gout it has also proved of value, and in the 'run down' condition which is so common in middle life. Chronic diarrhoea and certain forms of constipation have in numerous instances yielded to the treatment, the whey culture being usually found the most suitable. Then, in some forms of anaemia, the lactic acid cultures have proved most successful, and, as a means of rendering the gastro-intestinal track aseptic previous to operations, they have proved of considerable value.

"If all this has been accomplished in a year or two, what may we look forward to in the future when more extended use and experiment shall have more fully exhausted the possibilities of the cure? But if we follow the example of the different nations who have so long used soured milk as a regular article of diet, does it not seem probable that we may eliminate some, at least, of the causes of ill-health that call for the intervention of the doctor?

"The human organism is by no means perfect; we have within us many defective parts, and some organs whose working seems to be against the welfare of the economy. It has now been clearly shown that one of the chief of these is the large intestine, as to the use of which only vague and unsatisfactory theories have been formed.

"There can be no doubt as to the damage which it frequently inflicts on the system, and, thanks to the researches of Prof. Metchnikoff and other investigators, we seem to be in possession of a natural remedy which is sufficient to deal with the evils it produces."